

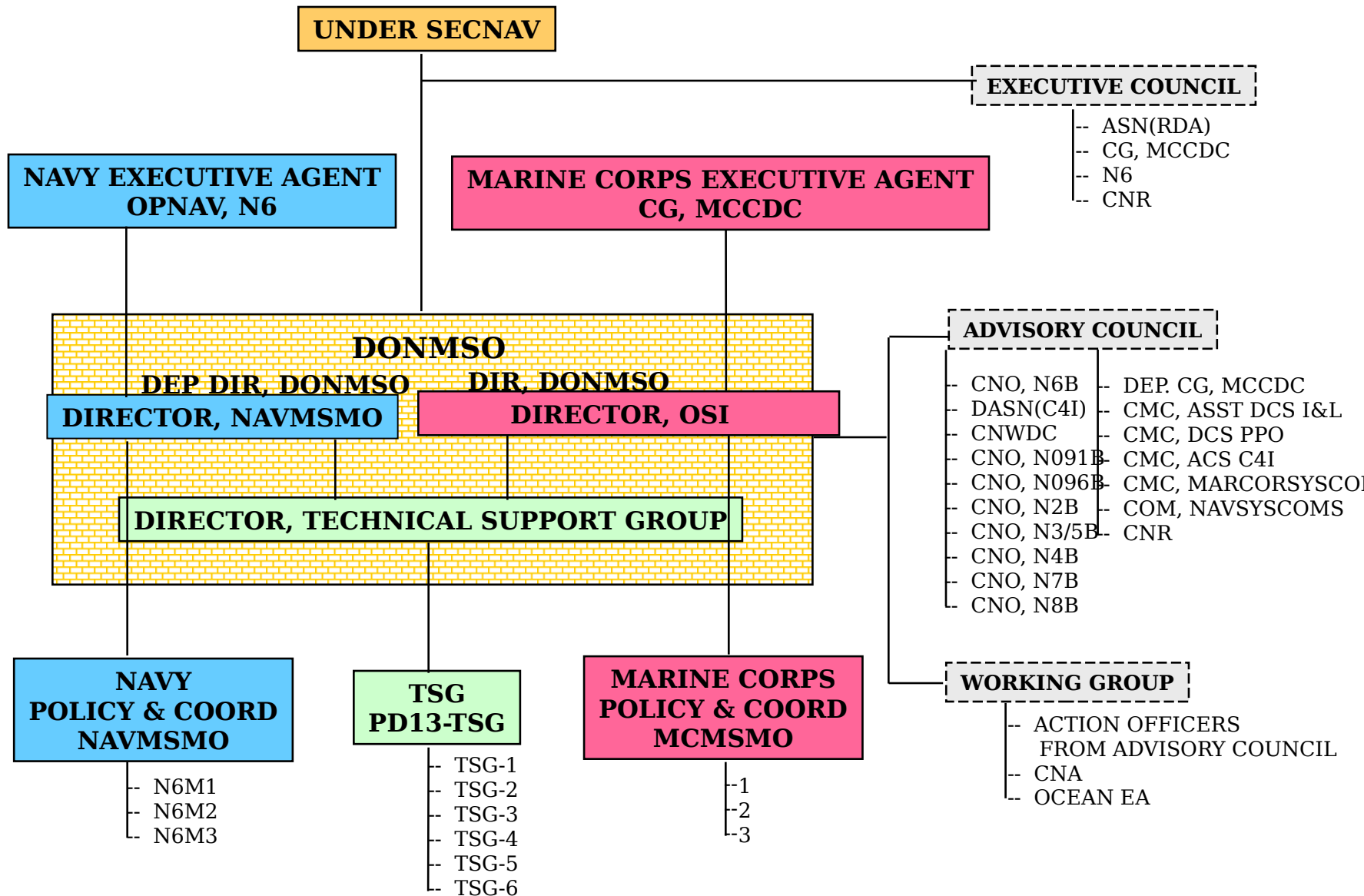


INVESTIGATION INTO ECONOMICS OF MODELING & SIMULATION (NAVY)

**Summer Computer Simulation Conference
12 July 1999**

**Jim Weatherly
Director, Department of Navy M&S - Technical Support Group
CNO - N6MT , (703) 601-1496
weatherly.jim@hq.navy.mil**

DEPARTMENT OF NAVY MODELING & SIMULATION



NAVMSMO Role

Provide
centralized
management
of Navy M&S

Coordinate M&S
efforts across
functional areas



Develop policies and
procedures for Navy M&S
standardization

**Break the Stovepipe Management of Corporate
Navy M&S**

NAVMSMO Current Interests

- Return on Investment (ROI): M&S support to the fleet
- Authoritative representation of the ocean environment and of Navy systems
- Y2K compatibility
- HLA compatibility
- VV&A
- M&S standards and federations
- Interoperability



Outline

- **Value Measurements of M&S**
 - **Relative Worth, Utility, Importance**
- **Economic Indicators of M&S**
 - **Analysis of Production & Consumption**

Assessing the Value of M&S

- **M&S has been & continues to be over**
 - **users / operators are becoming wary**
 - **“M&S has value, utility, payoff,.....”**
said by many; substantiated by few
- **Establishing an aggregated value is d**

Relative Value of M&S

- **Worth: Cost Terms**
 - **ROI**
 - **Cost Benefit**
 - **Cost Avoidance**
- **Utility: Allows Impractical / Impossible**
 - **Training**
 - **Testing**
 - **Alternative Assessments**
- **Importance: Meeting Needs**
 - **Faster**
 - **Better**

Indicators of Economics in M&S

- **Anecdotal / Narrative**
 - Provides some understanding of value
 - Does not provide sufficient insight to tailor investments or answer the critics
- **Rigorous Measures of Merit (MOM) Assessment**
 - Requirements (with appropriate sub-categories)
 - Means to meet requirements
 - Defined MOMs
 - M&S Capabilities / Advantages
- **Cost Analysis**
 - ROI
 - Cost Benefit
 - Cost Avoidance

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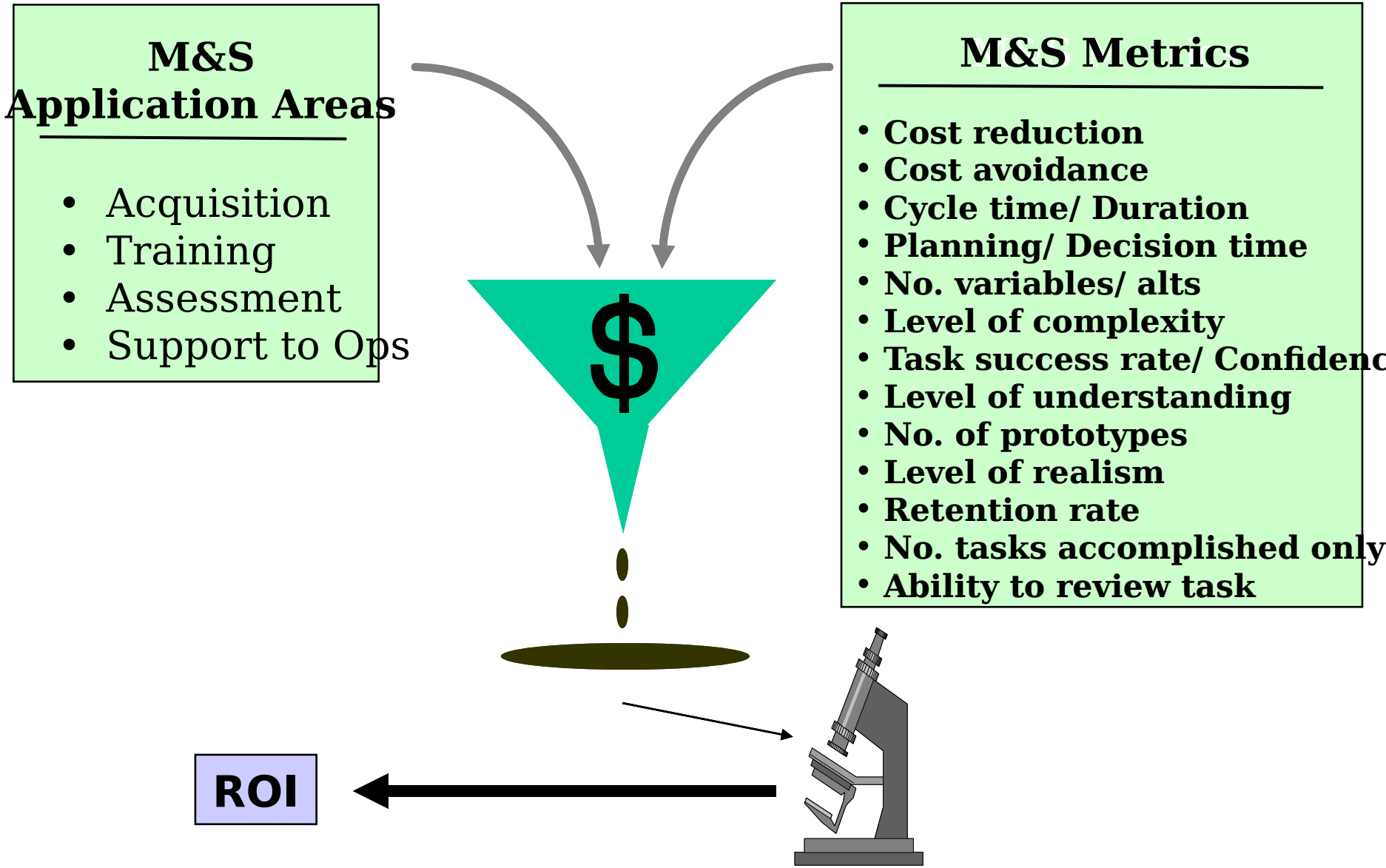
Measures of Merit (MOM) Analysis

| DON Requirements | Functions, Phases, or Levels | Means | MOM | M&S Advantages |
|---|---|--|---|---|
| Assessment: Requirements Force Structure Manpower/Fig Log & Infrastructure Readiness & Sustain. | C4 & Info Warfare Intel/Surveil, Recon Strike Joint Littoral Warfare Maritime Supt of Land Forces Forward Engage/ Deterrence NucDet/Counterpro of WMD Readiness Training Manpower & Personnel Support & Infrastructure Special Access Programs Others | Studies & Analyses: Manual Spreadsheet Historical Working Groups Wargames Modeling Simulation | Cost # alternatives Duration/ turn around time # of variables considered Dynamic interactions Confidence level | More reproducibility Complex scenarios Greater # alts exam Fast turn around Greater # variables considered |
| Support to Operations: Review Current Situation Project Future Campaigns Decide on Need for Action Issue Planning Guidance Develop COAs Analyze COAs Compare COAs Select or Modify COAs Execute | C4 & Info Warfare Intel/Surveil, Recon Strike Joint Littoral Warfare Maritime Supt of Land Forces Forward Engage/ Deterrence NucDet/Counterpro of WMD Readiness Training Manpower & Personnel Support & Infrastructure Special Access Programs Others | DPP/ CAP: Manual/ heuristic Wargames Plan/ decision briefs Working groups Simulations Operations | Mission success rate: Coordination Familiarity Cost: Execution Material Personnel Attrition Material Personnel Elapsed planning/decision time #COAs assessed | Ability to rehearse in hostile terrain More rapid assessment/ planning More COAs assessed Faster COA development More detailed plans Lower cost via fewer mistakes Increased chance for mission success Lower casualty count/familiarity |
| Training: PersQualStnds Individual Training Stnds Collective Training Stnds NMETs JMETs | Subsystem Skill Team/ Unit Ship Group Fleet Joint | Individual School House OBT/ET OJT Range CPX, FLTEX Wargames Simulation (L/C/V) | Cost: Operating Attrition Readiness: Type & Creqtrng profiles Qualification level (PMRs) Retention | Ability to conduct dangerous profiles, reducing potential casualties Deployable systems Warfighting context Low envirn impact Ammo not expended More reps possible |
| Acquisition: (Mission Analysis Reqds) Concept Development/Defn Demonstration & Validation Engineering Mads Production & Deployment Operations & Support | Design prototype Test/ analyze Build Deploy Support | Models Simulation Bread board Prototyping LFT OT/DT OPS CAM Flex manufacturing Assembly line Shake-out Just-in-time Remote via data-link On-site (platform) | Cycle time Costs Development Testing Maintenance # of alternatives | Fewer and quicker design changes Reduces Time to Market Fewer tests in T&E phase Low maint costs for better design Greater # test conditions Greater # design alternatives Fewer Jigs, Prototypes, Mock-Ups, etc. Improves Corporate Competitiveness Assists in Distributed Development Increases Customer "Buy In" & Reduces Approval Cycle |

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Cost Analysis Process



Translating Metrics Into Cost

M&S Metrics

Change In

Cost Savings

Cost Reduction

Dollars

Direct

Cost Avoidance

Dollars

Direct

Cycle Time/ Duration

Labor Hours

Mil Pers

Civ Pers

Planning/ Decision Time

Labor Hours

Mil Pers

Civ Pers

No. Variables/ Alts

Level of Complexity

Task Success Rate

Level of Understanding

No. of Prototypes

Level of Realism

Retention Rate

No. of Tasks Accompl. only w/ Sim

Ability to Review Task

Some Measures Are In Dollars

Some Can Be Converted

But Some Are Very Difficult to Convert

(and Yet They May Dominate)

Conclusion

- **Focus on conversion techniques from MOM to \$ metrics and resultant ROI numbers**
- **Need to use both a well structured MOM-Type Approach and a Cost Approach together to capture the true economics of M&S**